

## IN THE ABSTRACT

(with reference to FIG. 7)

A noise shaping arrangement for a phase locked loop includes a first order sigma-delta modulator (500) arranged to provide a first-order quantized output and a feedback path output (508). A second order sigma-delta modulator (520) is arranged to receive the feedback path output (508) and provides a second order quantized output. A combination block (530) combines the first and second order quantized outputs to provide a combined third order quantized output (540), which provides noise shaping with a frequency notch spectrum. In this way a new quantization noise shape of third order is provided, such that quantization phase noise may be lowered, the PLL loop bandwidth may be increased, modulation phase error may be reduced and PLL locking speed increased.